

IN THE CLAIMS:

1.-34. (Cancelled)

35. (Previously Presented) A fiber amplifier comprising
a gain optical fiber having only one single-mode core, said core containing gain ions
capable of producing stimulated emission of signal light within a predetermined band of
wavelengths including wavelengths λ_s when pumped with pump light of wavelength λ_p , said fiber
having first and second ends,
a filtering fiber containing gain ions for filtering signal light,
a pump light-attenuating fiber having a core containing a dopant that attenuates said
pump light while signal light remains substantially unattenuated, said pump light-attenuating
fiber connecting the second end of said gain fiber to an end of said filtering fiber,
means for introducing pump light of wavelength λ_p into the first end of said said gain
fiber,
and means for introducing a signal of wavelength λ_s into one of the ends of the series
combination of said gain fiber, said pump light-attenuating fiber and said filtering fiber, the gain
ions of said filtering fiber remaining unexcited during operation because of the pump light
filtering action of said pump light-attenuating fiber, whereby said filtering fiber alters the
spectral gain of said amplifier.

36. (Previously Presented) A fiber amplifier comprising
first and second gain optical fiber sections, each having only one single-mode core, said
core containing dopant ions capable of producing stimulated emission of light within a
predetermined band of wavelengths including a wavelength λ_s when pumped with light of
wavelength λ_p , each gain fiber section having first and second ends,
first and second light-attenuating fiber sections, each having a core containing a dopant
that attenuates optical power in at least one wavelength band including said wavelength λ_p ,
while optical power at said wavelength λ_s remains substantially unattenuated thereby, each pump
light-attenuating fiber section having first and second ends, the first end of each of said pump

light-attenuating fiber sections being spliced to a respective one of the second ends of said gain fiber sections,

a filtering fiber, the ends of which are respectively connected to the second ends of said pump light attenuating fiber sections, said filtering fiber being doped with gain ions,

means for introducing pump light of wavelength λ_p into the first end of each of said gain fiber sections, and

means for introducing a signal of wavelength λ_s into the first end of one of said gain fiber sections, the gain ions of said filtering fiber remaining unexcited during operation because of the pump light filtering action of said pump light-attenuating fiber.

37. (Previously Presented) A fiber amplifier comprising

a gain optical fiber having only one single-mode core, said core containing dopant ions capable of producing stimulated emission of light within a predetermined band of wavelengths including a wavelength λ_s when pumped with light of wavelength λ_p , said gain fiber having input and output ends,

filtering means for attenuating light at at least some of the wavelengths within said predetermined band of wavelengths, said filtering means containing ions that can be excited by light of wavelength λ_p ,

means for introducing a signal of wavelength λ_s into said gain fiber input end,

means for introducing pump light of wavelength λ_p into said gain fiber, and

means for preventing the excitation of said filtering means by light of wavelength λ_p .

38. (Previously Presented) A fiber amplifier in accordance with claim 37 wherein said gain fiber is co-doped with signal light absorbing ions that are different from said gain ions.

39. (Previously Presented) A fiber amplifier comprising

a gain optical fiber having only one single-mode core, said core containing dopant ions capable of producing stimulated emission of light within a predetermined band of wavelengths including a wavelength λ_s when pumped with light of wavelength λ_p , said gain fiber having input and output ends, said dopant ions being selected from the group consisting of erbium, neodymium and praseodymium,

filtering means for attenuating light at at least some of the wavelengths within said predetermined band of wavelengths, said filtering means containing a dopant selected from the group consisting of erbium, dysprosium, neodymium, ytterbium, samarium, praseodymium, thulium, vanadium and cadmium selenide,

means for introducing a signal of wavelength λ_s into said gain fiber input end, and

means for introducing pump light of wavelength λ_p into said gain fiber.

40. (Previously Presented) A gain amplifier in accordance with claim 39 wherein said filtering means comprises an optical fiber containing said dopant ions.

41. (Previously Presented) A fiber amplifier having a flattened gain spectrum comprising

a gain optical fiber having only one single-mode core, said core containing dopant ions capable of producing a gain spectrum due to stimulated emission of light within a predetermined band of wavelengths including a wavelength λ_s when pumped with light of wavelength λ_p , said gain fiber having input and output ends, and wherein the gain spectrum of said gain optical fiber over said band of wavelengths has a first portion having a relatively small gain variation over a region of said band wavelengths and a second portion having a relatively large gain variation over a different region of said band wavelengths, wherein said first portion of the gain spectrum is relatively flat and wherein said second portion is not flat and exhibits a greater gain than the gain exhibited over said relatively flat portion;

ion filtering means for absorbing light within said predetermined band of wavelengths, said ion filtering means having an absorption spectrum having a first portion exhibiting relatively small absorption over said region of said band of wavelengths and a second portion having a relatively large absorption of said different region of said band of wavelengths where the gain spectrum is not flat, said ion filtering means comprising a concentration and distribution of unpumped gain ions within said ion filtering means wherein amplified light having wavelengths within said predetermined band of wavelengths where the gain spectrum is not flat is attenuated to an extent such that the gain spectrum over the entire predetermined band of wavelengths is flattened and exhibits relatively small gain variation over said entire band of wavelengths;

means for introducing a signal of wavelength λ_s into said gain fiber input end,

means introducing pump of wavelength λ_p into said gain fiber, and
means for preventing the excitation of said pumped gain ions by light of wavelength λ_p .

42. (Previously Presented) A fiber amplifier comprising
a gain optical fiber having only one single-mode core, said core containing dopant ions
capable of producing stimulated emission of light within a predetermined band of wavelengths
including a wavelength λ_s when pumped with light of wavelength λ_p said gain fiber having input
and output ends, and wherein the gain spectrum of said gain optical fiber, over said band of
wavelengths and when pumped with light from wavelength λ_p , has a first portion which is
relatively flat and a second portion which is not flat and exhibits gain greater than the gain
exhibited over said relatively flat portion;

filtering means for attenuating light at at least some of the wavelengths within said
predetermined band of wavelengths, said filtering means containing ions that can be excited by
light of wavelength λ_p , said filtering means having a transmission curve over said predetermined
band of wavelengths and in the absence of excitation by said gain fiber over said predetermined
band of wavelengths when said gain fiber is excited by light at wavelength λ_p so that when light
in the range of said predetermined range of wavelengths is amplified and filtered by said filtering
means, the resulting gain spectrum for said amplifier over said predetermined range of
wavelengths is substantially flat;

means for introducing a signal of wavelength λ_s into said gain fiber input end;
means for introducing pump light of wavelength λ_p into said gain fiber; and
means for preventing the excitation of said filtering means by light of wavelength λ_p .

43. (Previously Presented) A fiber amplifier comprising
a gain optical fiber having only one single-mode core, said core containing dopant ions
capable of producing stimulated emission of light within a predetermined band of wavelengths
including a wavelength λ_s when pumped with light of wavelength λ_p , said gain fiber having input
and output ends, said dopant ions being selected from the group consisting of erbium,
neodymium and praseodymium, and wherein the gain spectrum of said gain optical fiber, over
said band of wavelengths and when pumped with light from wavelength λ_p has a first portion

which is relatively flat and a second portion which is not flat and exhibits gain greater than the gain exhibited over said relatively flat portion;

filtering means for attenuating light at at least some of the wavelengths within said predetermined band of wavelengths, said filtering means containing a dopant selected from the group consisting of erbium, dysprosium, neodymium, ytterbium, samarium, praseodymium, thulium, vanadium and cadmium selenide, said filtering means having a transmission curve over said predetermined band of wavelengths and in the absence of excitation by said gain fiber over said predetermined band of wavelengths when said gain fiber is excited by light at wavelength λ_p so that when light in the range of said predetermined range of wavelengths is amplified and filtered by said filtering means, the resulting gain spectrum for said amplifier over said predetermined range of wavelengths is substantially flat;

means for introducing a signal of wavelength λ_s into said gain fiber input end; and
means introducing pump light of wavelength λ_p into said gain fiber.

44.-50. (Cancelled)